

Half the species belong to the old world, which is inhabited by species of the Legions *Euphæa*, *Libellago* and *Calopteryx*. The genus *Hæterina*, containing thirty species, six species of *Calopteryx*, the genera *Heliocharis* and *Dictierias* each containing a single species, and the Legions *Amphipteryx* and *Thore*, are found in America, and principally in the tropical parts.

PROCEEDINGS OF LEARNED SOCIETIES.

ROYAL INSTITUTION OF GREAT BRITAIN.

February 10, 1854.—Right Hon. Baron Parke, Vice-President, in the Chair.

On the Structure and Homologies of Teeth. By Prof. OWEN, F.R.S.

The Lecturer commenced by observing that, although the teeth were among the least vitalized of animal parts, and commonly possessed no power of repairing fracture or decay, they presented many phænomena of anatomical, physiological, and homological interest, a selection from which he proposed to offer as the subject of the evening's discourse.

Any hard body attached to the walls and projecting into the cavity of the mouth, where it is exposed to view when the mouth is open, is called a *tooth*: but the parts properly so called, are those which consist of a gelatinous basis, hardened by earthy salts, in which the phosphate of lime predominates. Such teeth are peculiar to the Vertebrate Classes. In them they present manifold varieties as to number, size, form, structure, position, and mode of attachment, but are principally adapted for seizing, tearing, dividing, pounding, or grinding the food; in some species they are modified to serve as formidable weapons of offence and defence; in others as aids in locomotion, means of anchorage, instruments for uprooting or cutting down trees, or for transport and working of building materials; they are characteristic of age and sex; and in man they have secondary relations subservient to beauty and to speech.

Teeth are always intimately related to the food and habits of the animal, and are therefore highly interesting to the physiologist: they form for the same reason important guides to the naturalist in the classification of animals; and their value, as zoological characters, is enhanced by the facility with which, from their position, they can be examined in living or recent animals; whilst the durability of their tissues renders them not less available to the palæontologist in the determination of the nature and affinities of extinct species, of whose organization they are often the sole remains discoverable in the deposits of former periods of the earth's history.

Teeth are not of a uniform tissue or substance like bone: that which forms the body of the tooth is called "dentine;" the tissue which forms the outer crust is called "cement;" and in most Vertebrata a third substance is situated between the dentine and cement,

called "enamel." The characteristics of these three primary tissues of a tooth were briefly defined: they differ in hardness, the cement being least dense, the enamel most.

The tubular structure of the dentine relates to the disposition of the hard material so as best to resist pressure, and to the circulation of plasma, transuded from the pulp through the dentine, so as to maintain a certain, though languid, vitality of the tissue.

Some secondary modifications of the chief tissue of teeth were noticed under the names of osteo-dentine, vaso-dentine, vitro-dentine, dendro-dentine, and labyrintho-dentine; the latter highly complex and beautiful modification being due rather to a modification of disposition, than of composition of the dentine itself. The singular labyrinthic interblending of the dentine and cement reaches its maximum of complexity in the teeth of some gigantic extinct batrachian Reptiles, from the Triassic formations, called from their distinct peculiarities, "Labyrinthodonts."

The chief varieties in the form of the teeth in Fishes were then enumerated, and more especially illustrated in the predatory Pike, the vegetarian Carp, the shell-crushing Myliobates, and the coral-browsing Scarus. The elastic attachment of the teeth of the Lophius, and the mode of growth and succession of the Shark's numerous teeth were explained.

From the class of Reptiles examples of dental structure were selected from the Serpent-tribes, in relation to the poison-apparatus, and from the Crocodile, in respect of the constant succession and displacement of the teeth. The structure of the teeth of the extinct *Iguanodon* and *Megalosaurus* was also noticed.

The Mammalian class might be divided, in regard to the succession of the teeth, into two groups—the *Monophyodonts*, or those that generate but one set of teeth, and the *Diphyodonts*, or those that generate two sets of teeth.

The Monophyodonts include the Cetacea and the *Bruta* (*Edentata* of Cuvier); all the other Orders are Diphyodonts.

The teeth of the Mammalia, especially the Diphyodonts, have usually so much more definite and complex a form than those of fishes and reptiles, that three parts are recognised in them; viz. the "fang," the "neck," and the "crown." The fang or root (*radix*) is the inserted part; the crown (*corona*) the exposed part; and the constriction which divides these is called the neck (*cervix*). The term "fang" is properly given only to the implanted part of a tooth of restricted growth, which fang gradually tapers to its extremity; those teeth which grow uninterruptedly have not their exposed part separated by a neck from their implanted part, and this generally maintains to its extremity the same shape and size as the exposed crown.

It is peculiar to the class Mammalia to have teeth implanted in sockets by two or more fangs; but this can only happen to teeth of limited growth, and generally characterizes the molars and premolars: perpetually growing teeth require the base to be kept simple and widely excavated for the persistent pulp. In no mammiferous animal

does ankylosis of the tooth with the jaw constitute a normal mode of attachment. Each tooth has its particular socket, to which it firmly adheres by the close co-adaptation of their opposed surfaces, and by the firm adhesion of the alveolar periosteum to the organized cement which invests the fang or fangs of the tooth.

True teeth implanted in sockets are confined, in the Mammalian class, to the maxillary, premaxillary, and mandibular, or lower maxillary bones, and form a single row in each. They may project only from the premaxillary bones, as in the Narwhal, or only from the lower maxillary bone, as in Ziphius; or be apparent only in the lower maxillary bone, as in the Cachalot; or be limited to the superior and inferior maxillaries, and not present in the premaxillaries, as in the true Ruminants and most Bruta.

The teeth of the Mammalia usually consist of hard unvascular dentine, defended at the crown by an investment of enamel, and everywhere surrounded by a coat of cement. The coronal cement is of extreme tenuity in Man, Quadrumana, and terrestrial Carnivora; it is thicker in the Herbivora, especially in the complex grinders of the Elephant; and is thickest in the teeth of the Sloths, Megatherioids, Dugong, Walrus, and Cachalot. Vertical folds of enamel and cement penetrate the crown of the tooth in the Ruminants, and in most Rodents and Pachyderms, characterizing by their various forms the genera of the last two orders; but these folds never converge from equidistant points of the circumference of the crown towards its centre. The teeth of the quadrupeds of the order *Bruta* (*Edentata*, Cuv.) have no true enamel; this is absent likewise in the molars of the Dugong and the Cachalot. The tusks of the Narwhal, Walrus, Dinotherium, Mastodon, and Elephant, consist of modified dentine, which in the last two great proboscidian animals is properly called "ivory," and is covered by cement.

The Dolphins and Armadillos present little variety in the shape of teeth in the same animal; the teeth are often very numerous; and this sameness of form is characteristic of most of the monophyodonts.

In almost all the other Mammalia, particular teeth have special forms for special uses: thus, the front teeth, from being commonly adapted to effect the first coarse division of the food, have been called cutters or *incisors*; and the back teeth, which complete its comminution, grinders or *molars*; large conical teeth, situated behind the incisors, and adapted by being nearer the insertion of the biting muscles, to act with greater force, are called holders, tearers, laniaries, or more commonly *canine* teeth, from being well developed in the Dog and other Carnivora, although they are given, likewise, to many vegetable feeders for defence or combat: *e. g.* Musk-deer.

Molar teeth, which are adapted for mastication, have either tuberculate, or transversely ridged, or flat summits, and usually are either surrounded by a ridge of enamel, or are traversed by similar ridges arranged in various patterns. Certain molars in the Dugong, the Mylodon, and the Zeuglodon, are so deeply indented laterally by opposite longitudinal grooves, as to appear, when abraded, to be composed of two cylindrical teeth cemented together, and the transverse

section of the crown is bilobed. The teeth of the *Glyptodon* were fluted by two analogous grooves on each side. The large molars of the Capybara and Elephant have the crown cleft into a numerous series of compressed transverse plates, cemented together side by side.

The modifications of the crown of the molar teeth are those that are most intimately related to the kind of food of the animal possessing them. Illustrations were given of the chief of these modifications in the purely Carnivorous mammals, where the molars are simple, trenchant, and play upon each other like scissor-blades: in the mixed feeding species where the working surface of the molars is flattened or tuberculated: in the insectivorous species where it is bristled with sharp points: and in the purely herbivorous kinds, where the broad grinding surfaces of the teeth are complicated by folds and ridges of the enamel entering the substance of the tooth: the most complex forms being presented by the Elephants.

Teeth of each of the kinds above determined, and arbitrarily named "incisors," "canines," "molars," have received other special names, in regard to certain peculiarities of form or other property; and the ablest comparative anatomists have been led astray in determining their homologies when they have suffered themselves to be guided exclusively by morphological characters. The small anterior grinding teeth in the human subject have been called "bicuspid." The penultimate upper tooth and the last lower tooth in the Lion are termed, from their peculiar form, "sectorials," or "carnassial teeth," "molaires carnassières" of Cuvier. Teeth of an elongated conical form, projecting considerably beyond the rest, and of uninterrupted growth, are called "tusks;" such are the incisors of the Elephant and Dugong, and the canines of the Boar and Walrus: the long and large incisors of the Rodents have been termed, from the shape and structure of their cutting edge, scalpriform or chisel-teeth, "*dentes scalprarii*." The inferior incisors of the flying Lemurs (*Galeopithecus*) have the crown deeply notched like a comb, and are termed "*dentes pectinati*." The canines of the Baboons are deeply grooved in front, like the poison-fangs, "*dentes canaliculati*," of some serpents. The compressed conical crowns of the molar teeth of the small clawed Seals, *Stenorhynchus*, are divided either like a trident into three sharp points, or like a saw, into four or five points; the molars of the great extinct *Zeuglodon* had a similar form; such teeth have been called *dentes serrati*. But the philosophical course of the knowledge of nature tends to explode needless terms of art, invented for unimportant varieties, and to establish and fix the meaning of those words that are the signs of determinate species of things.

The Cuviers divided the molar series of teeth, according to their form, into three kinds: "false molars," "carnassials," and "tubercular molars;" and, in giving the generic characters of Mammalia, based the dental formulæ on this system: thus the genus *Felis* is characterized as having "fausses molaires $\frac{2-2}{2-2}$, carnassières

$\frac{1-1}{1-1}$, tuberculeuses $\frac{1-1}{0-0}$; = $\frac{8}{6}$."

In a diagram of the leading modifications of Diphyodont dentition,

an uninterrupted line marked "Cuvier" was made to intersect the teeth in each jaw of the Carnivora, called by that great anatomist "carnassières:" those anterior to them being the teeth which he called "fausses molaires;" those behind being the "tuberculeuses." Most zoologists, both at home and abroad, have adopted the Cuvierian system of formulising the molar teeth. Prof. De Blainville, however, abandoned that classification of the molar series, without assigning his objections to it; and proposed another, in which he divides the series into "avant-molaires," "principales," and "arrière-molaires;" he exemplifies this division by the human dentition, in which the five grinders on each side of both jaws are formulised as "two avant-molaires, one principale, and two arrière-molaires." The teeth regarded by De Blainville as the homologues of these, were indicated in the diagram above referred to by a dotted line intersecting the "dent principale" in each species.

Truly homologous teeth are determined, like other parts, by their relative position, by their connexions, and by their development. The teeth of one side of the jaw repeat, are answerable to, or are *homotypes*, of the teeth on the other side; and those in the upper jaw usually correspond, in like manner, to those in the under jaw.

Those teeth which are implanted in the premaxillary bones, and in the corresponding part of the lower jaw, are called "incisors," whatever be their shape or size. The tooth in the maxillary bone, which is situated at, or near to, the suture with the premaxillary, is the "canine," as is also that tooth in the lower jaw which, in opposing it, passes *in front of its crown* when the mouth is closed. The first-formed incisors and canines are deciduous; they are succeeded and displaced vertically by the permanent incisors and canines. With regard to the other teeth, their true nature and homologies, about which the difference of opinion has chiefly prevailed amongst anatomists, are determinable not by shape or size, or by relative position to the zygoma, but by developmental characters exclusively. The first set are the "deciduous molars;" the teeth which displace and succeed them vertically are the "premolars;" the more posterior teeth, which are not displaced by vertical successors, but succeed each other horizontally, are the "molars," properly so called.

The phenomena of the development and succession of the teeth were then explained and illustrated in examples of Carnivorous, Herbivorous, and mixed-feeding species of Diphyodont Mammalia.

Genus *Felis*.—In the Cat, the deciduous incisors begin to appear between two and three weeks old; the canines next, and then the molars follow, the whole being in place before the sixth week. After the seventh month they begin to fall in the same order; but the lower sectorial molar and the tubercular tooth above, appear before the deciduous molars are shed; they do not push out any predecessors, and have no successors; they are, therefore, true molars. The first deciduous molar in the upper jaw is a very small and simple one-fanged tooth; it is succeeded by the corresponding tooth of the permanent series, which answers to the second premolar of the Hyæna and Dog. The second deciduous molar is the sectorial tooth; its

blade is trilobate, but both the anterior and posterior smaller lobes are notched, and the internal tubercle, which is relatively larger than in the permanent sectorial, is continued from the base of the middle lobe, as in the deciduous sectorial of the Dog and Hyæna; it thus typifies the form of the upper sectorial, which is retained in the permanent dentition of several Viverrine and Musteline species. The third or internal fang of the deciduous sectorial is continued from the inner tubercle, and is opposite the interspace of the two outer fangs. The Musteline type is further adhered to by the young Feline in the large proportional size of its deciduous tubercular tooth. In the lower jaw, the first milk-molar is succeeded by a tooth which answers to the third lower premolar in the Dog and Civet. The deciduous sectorial, which is succeeded by the premolar, answering to the fourth in the Dog, has a smaller proportional anterior lobe, and a larger posterior talon, which is usually notched; thereby approaching the form of the permanent lower sectorial tooth in the *Mustelidæ*. The last tooth which is functionally analogous to the carnassial above, is the first of the true molar series, and is the homotype of the little tubercular tooth above.

The true nature of the dentition of the Lion and other Felines, as determined by the above phænomena of development, is:—

$i. \frac{3-3}{3-3}, c. \frac{1-1}{1-1}, p. \frac{3-3}{2-2}, m. \frac{1-1}{1-1}$: signifying that there are 3 incisors, 1 canine, 3 premolars, and 1 molar, on each side of the

upper jaw, and the same, with the exception of a small premolar, on each side of the lower jaw. The teeth, which are the seat of the sectorial or carnassial modifications, are not homologous or homotypal in the two jaws.

In the genus *Ursus* the dentition was, in like manner, shown to be:— $i. \frac{3-3}{3-3}, c. \frac{1-1}{1-1}, p. \frac{4-4}{4-4}, m. \frac{2-2}{3-3} = 42$.

In the Hog, four deciduous molars are succeeded by four premolars, vertically; and three molars are developed in horizontal succession behind these, the dental formula being:—

$i. \frac{3-3}{3-3}, c. \frac{1-1}{1-1}, p. \frac{4-4}{4-4}, m. \frac{3-3}{3-3} = 44$.

This number of teeth is never surpassed in the Diphyodont series; and the Lecturer regarded it as the typical dentition. It is, however, rarely maintained in existing species, but appears to have been much more common in extinct Mammalia, especially those from the most ancient tertiary epochs; illustrations of which were given in the *Hyænodon* and *Hyopotamus*, and examples cited in the extinct genera *Chæropotamus*, *Anthracotherium*, *Hyracotherium*, *Oplotherium*, *Merycopotamus*, *Hippohyus*, *Anoplotherium*, *Palæotherium*, and *Paloplotherium*. In the three latter genera, Professor Owen had determined the nature of the molar series to be the same as in the Hog, by specimens showing the deciduous dentition.

In the hoofed quadrupeds with toes in uneven number (*Perissodactyla*), whose premolars, for the most part, repeat both the form

and the complex structure of the true molars, such premolars are distinguished by the same character of development as those of the *Artiodactyla*, or Ungulates with toes in even number; although here the premolars are distinguished also by modifications of size and shape.

In most of the South American Quadrumana, the number of teeth, as contrasted with the Monkeys of Africa and Asia, is increased to thirty-six, by an addition of one tooth to the molar series on each side of both jaws. It might be concluded *à priori*, that as three is the typical number of true molars in the placental Mammalia with two sets of teeth, the additional tooth in the New-World Monkeys would be a premolar, and form one step to the resumption of the normal number (four) of that kind of teeth. The proof of the accuracy of this inference was given by the state of the dentition in the young of the Howler-Monkey (*Mycetes*), in which a diagram was exhibited of a dissection of the jaws, exposing the germs of the permanent teeth: the crown of a premolar being found above the *third* milk-molar in place, as well as above the *second* and *first*. As regards number, therefore, the molar series, in *Mycetes*, is intermediate between that of the Bear, *Ursus*, and *Felis*; the little premolar *p. i.* in *Ursus*, tells plainly enough which of the four is wanting to complete the typical number in the South American Monkey, and which is the additional premolar distinguishing its dental formula from that of the Old-World Monkeys and Man.

With regard to the Human Dentition, the discovery, by the great poet Goethe, of the limits of the premaxillary bone in man, leads to the determination of the incisors, which are reduced, as in Apes and Monkeys, to two on each side of both jaws; the contiguous tooth shows by its shape, as well as position, that it is the canine; and the characters of size and shape have also served to divide the remaining five teeth in each lateral series into two bicuspid and three molars. In this instance, as in the dentition of the Bear, the secondary characters conform with the essential ones. But since we have seen of how little value shape or size are, in the order Carnivora, in the determination of the exact homologies of the teeth, it is satisfactory to know that the more constant and important character of development gives the requisite certitude as to the nature of the so-called bicuspid in the Human subject. The condition of the teeth was shown in the jaws of a child of about six years of age. The two incisors on each side are followed by a canine, and this by three teeth having crowns resembling those of the three molar teeth of the adult. In fact, the last of the three is the first of the permanent molars; it has pushed through the gum, like the two molars which are in advance of it, without displacing any previous tooth, and the substance of the jaw contains no germ of any tooth destined to displace it; it is therefore, by this character of its development, a true molar, and the germs of the permanent teeth, which are exposed in the substance of the jaw between the diverging fangs of the two anterior molars, prove them to be temporary, destined to be replaced, and prove also that the teeth about to displace them are premolars. According, therefore,

to the rule previously laid down, we count the permanent molar in place, the first of its series, and the adjoining premolar as the last of its series, and consequently the fourth of the typical dentition; the next premolar in advance being the penultimate or third of the typical series.

We are thus enabled, with the same scientific certainty as that whereby we recognise in the middle toe of the foot the homologue of that great digit which forms the whole foot, and is encased by the hoof in the Horse, to point to the second bicuspid in the upper jaw, and to the first molar in the lower jaw of Man, as the homologues of the great carnassial teeth of the Lion and Tiger. We also conclude that the teeth which are wanting in Man to complete the typical molar series, are the first and second premolars, the homologues of those which were marked in the diagram of the dentition of the Bear. The characteristic shortening of the maxillary bones required this diminution of the number of their teeth, as well as of their size, and of the canines more especially; and the still greater curtailment of the premaxillary bone is attended with a diminished number and an altered position of the incisors. One sees, indeed, in the Carnivorous series, that a corresponding decrease in the number of the premolars is concomitant with the shortening of the jaws. Already in the *Mustelidæ*, the first premolar below is abrogated; in *Felis* also above, with the further loss of the second premolar in the lower jaw; the true molars being correspondingly reduced in these strictly flesh-eating animals, but taken away from the back part of their series.

If we were desirous of further testing the soundness of the foregoing conclusions as to the nature of the teeth absent in the reduced dental formula of Man, we ought to trace the mode in which the type is progressively resumed in descending from Man through the Order most nearly allied to our own.

Through a considerable part of the Quadrumanous series, *e. g.* in all the Old-World genera above the Lemurs, the same number and kinds of teeth are present as in Man; the first deviation being the disproportionate size of the canines and the concomitant break or "diastema" in the dental series for the reception of their crowns when the mouth is shut. This is manifested in both the Chimpanzees and Orangs, together with a sexual difference in the proportions of the canine teeth. Then comes the added premolar in the New-World Monkeys, and the further additions in lower quadrupeds, until in the Hog genus we see the old primitive type of Diphyodont dentition resumed or retained.

With regard to the application of the above principles and characters to other or newly-discovered species:—When the premolars and the molars are below their typical number, the absent teeth are missing from the fore part of the premolar series and from the back part of the molar series. The most constant teeth are the fourth premolar and the first true molar; and, these being known by their order and mode of development, the homologies of the remaining molars and premolars are determined by counting the molars *from before backwards*, *e. g.* "one," "two," "three;" and the premolars *from behind*

forwards, “four,” “three,” “two,” “one.” The incisors are counted from the median line, commonly the foremost part of both upper and lower jaws, outwards and backwards. The first incisor of the right side is the homotype, transversely, of the contiguous incisor of the left side in the same jaw, and, vertically, of its opposing tooth in the opposite jaw; and so with regard to the canines, premolars, and molars; just as the right arm is the homotype of the left arm in its own segment, and also of the right leg of a succeeding segment. It suffices, therefore, to reckon and name the teeth of one side of either jaw in a species, with the typical number and kinds of teeth; *e. g.* the first, second and third incisors,—the first, second, third and fourth premolars,—the first, second and third molars; and of one side of both jaws in any case.

The homologous teeth being thus determinable, they may be severally signified by a symbol as well as by a name. The incisors, *e. g.*, by their initial letter *i.*, and individually by an added number, *i. 1*, *i. 2*, and *i. 3*; the canines by the letter *c.*; the premolars by the letter *p.*; and the molars by the letter *m.*; these also being differentiated by added numerals. Thus, the number of these teeth, on each side of both jaws, in any given species, Man *e. g.*, may be expressed by the following brief formula:—

$i. \frac{2-2}{2-2}, c. \frac{1-1}{1-1}, p. \frac{2-2}{2-2}, m. \frac{3-3}{3-3} = 32$; and the homologies of the individual teeth, in relation to the typical formula, may be signified by *i. 1*, *i. 2*; *c.*; *p. 3*, *p. 4*; *m. 1*, *m. 2*, *m. 3*: the suppressed teeth being *i. 3*, *p. 1*, and *p. 2*.

These symbols are so plain and simple as to form no obstacle to the ready comprehension of the facts explained by means of them. Were those facts described in the ordinary way, by means of the verbal phrases or definitions of the teeth; as for example, in Man, “the second deciduous molar, representing the fourth deciduous molar in the typical dentition,” instead of *d. 4*, and so on, the descriptions of the manifold modifications of the teeth and of dental development must continue to occupy much unnecessary space, and levy such a tax upon the attention and memory, as would inevitably tend to enfeeble the judgement and impair the power of seizing and appreciating the results of the comparison.

Each year’s experience had strengthened the lecturer’s conviction that the rapid and successful progress of the knowledge of animal structures, and of the generalizations deducible therefrom, would be mainly influenced by the determination of the homology of parts and organs, and by the concomitant power of condensing the propositions relating to them, and attaching to them signs or symbols equivalent to their single substantive names. In the lecturer’s work on the “Archetype of the Skeleton,” he had denoted most of the bones by simple numerals: the symbols of the teeth are fewer in number, are easily understood and remembered; and, if generally adopted, might take the place of names: they would, then, render unnecessary the endless repetition of the verbal definition of the part, harmonise conflicting synonyms, serve as a universal language, and at the same

time express the expositor's meaning in the fewest and clearest terms. The entomologist had long found the advantage of such signs as ♂ and ♀, in reference to the sexes of Insects and the like; and the anatomist would find it to his advantage to avail himself of this powerful instrument of thought, instruction and discovery, from which the chemist, the astronomer, and the geometrician have obtained such important results.

ZOOLOGICAL SOCIETY.

February 10, 1852.—William Yarrell, Esq., in the Chair.

The Chairman exhibited a specimen of the *Echiodon Drummondii* of Mr. Thompson of Belfast, a very rare species of fish, of which only one example has been previously known. Dr. Drummond obtained the first specimen on the beach at Carnclough, near Glenarm in the county of Antrim, in June 1836, cast ashore probably by the tide of the preceding night, after a strong easterly wind. The species was considered new to ichthyology, and was first described and figured in the Transactions of this Society by Mr. Thompson, vol. ii. p. 207. pl. 38. Nothing that has transpired since the publication of Mr. Thompson's paper has induced a belief that this species had been previously known.

The specimen now exhibited was most liberally sent to Mr. Yarrell by Mrs. Blackburn of Valencia, in the county of Kerry, who was perfectly aware of the characters, the rarity, and the value of the fish. It was found by her daughter Helen on the shore of the harbour of Valencia, after a violent storm from the west, which occurred there, on the 23rd of January last.

This example is smaller than the one noticed by Mr. Thompson, measuring only 8 inches in length, but quite perfect. Mr. Thompson's example measured 12 inches (Brit. Fishes, vol. ii. p. 417).

The following papers were then read:—

II. ON CYSTOSOMA SAUNDERSII, OF CURTIS AND WESTWOOD.

By A. W. SCOTT, M.A.

Head small; sides of the thorax running in a straight line from the head to an acute angle behind; abdomen of the male deeply constricted immediately behind first segment; second joint of the antennæ distinct from the third, and not forming with it the tapering setæ which terminates them; upper wings destitute of a nervure running parallel to their inner margin.

The male measures, in expanse of wings, nearly $4\frac{1}{4}$ inches; the female $3\frac{3}{4}$ inches.

The antennæ in both sexes are very short, 7-jointed, the two basal joints strong and thick, the remainder much finer and gradually terminating in a point.

The legs, anterior pair, with two minute spurs at the apex of tibia;